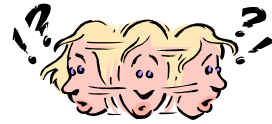


High School Physical Science Essential Questions



Standard 1: Physical Science

- ? What is stuff made of and what does it do?
- ? What makes you shake, rattle, and roll?
- ? Is it the motion of the ocean or the energy in it that matters?

High School Physical Science Curriculum Dashboard



Colorado Science Standard #1: Physical Science

K-12 Students Understand ...

- ✦ Newton's laws describe motion.
- ✦ Atoms combine or decay to form new substances
- ✦ Energy exists in various forms, is transformed, and conserved.

High School Students Understand ...

- ☑ Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion – but have limitations.
- ☑ Matter has definite structure that determines characteristic physical and chemical properties.
- ☑ Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy.
- ☑ Atoms bond in different ways to form molecules and compounds that have definite properties.
- ☑ Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined.
- ☑ When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases.

What's the Intended Learning? High School Physical Science Learning Targets (◆) and Supporting Evidence Outcomes

Essential to Know or Safety Net (E): Knowledge and skills that are **essential** for **all** High Schoolers to **master**, with non-mastery leading to intervention

Important to Know (I): Knowledge and skills that are **important** for **all** High Schoolers to **know** and **mastered** by **most** students

Nice to Know (N): Knowledge and skills that are **introduced** to **all** High Schoolers and **mastered** by **advanced** students



DOK =Depth of Knowledge

1 = Recall of facts or a simple task

2 = Skills and Concepts require students to make decisions or question

3 = Strategic Thinking requires students to explain or generalize information

4 = Extended Thinking requires developing & thinking over time or complex analysis

HS = Grade Level

S = Science

1 = Refers to Learning Target #

a = Refers to specific Evidence Outcome

Standard 1: Physical Science

◆ **LT1. I can describe and calculate the causes and effects of an object's motion. (DOK 1-3)**

HSS-1a. Gather, analyze, interpret data, and create graphs regarding position, velocity and acceleration of moving objects (DOK 1-3) **9th (E)**

HSS-1b. Develop, communicate, and justify an evidence-based analysis of the forces acting on an object and the resultant acceleration produced by a net force (DOK 1-3) **9th (E)**

HSS-1c. Develop, communicate, and justify an evidence-based scientific prediction regarding the effects of the action-reaction force pairs on the motion of two interacting objects (DOK 1-3) **9-12 (N)**

HSS-1d. Examine the effect of changing masses and distance when applying Newton's law of universal gravitation to a system of two bodies (DOK 1-2) **9-12 (N)**

HSS-1e. Identify the limitations of Newton's laws in extreme situations (DOK 1) **9-12 (N)**

◆ **LT2. I can use the characteristics of physical and/or chemical properties to identify and describe the structure of matter. (DOK 1-3)**

HSS-2a. Develop, communicate, and justify an evidence-based scientific explanation supporting the current model of an atom (DOK 1-3) **9th (E)**

HSS-2b. Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity (DOK 1-2) **9th (E)**

HSS-2c. Use characteristic physical and chemical properties to develop predictions and supporting claims about elements' positions on the periodic table (DOK 1-2) **9th(N), 11th (I)**

HSS-2d. Develop a model that differentiates atoms and molecules, elements and compounds, and pure substances and mixtures (DOK 2-3) **9th=(I), 11th=(E)**

◆ **LT3.1. I can recognize, analyze, interpret, and balance chemical or nuclear equations.**

HSS-3.1a. Recognize, analyze, interpret, and balance chemical equations (synthesis, decomposition, combustion, and replacement) or nuclear equations (fusion and fission) (DOK 1-2) **9th(N), 11th(E)**

HSS-3.1b. Predict reactants and products for different types of chemical and nuclear reactions (DOK 1-2) **9th(N), 11th (I)**

HSS-3.1c. Predict and calculate the amount of products produced in a chemical reaction based on the amount of reactants (DOK 1-2) **9th (N), 11th (I)**

◆ **LT3.2. I can explain how mass and energy are conserved in a reaction. (DOK 1-2)**

HSS-3.2a. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate the conservation of mass and energy (DOK 1-2) **9th(N), 11th(I)**

◆ **LT4. I can predict how atoms combine to form molecules and compounds, and I can describe their characteristics. (DOK 1-2)**

HSS-4a. Develop, communicate, and justify an evidence-based scientific explanation supporting the current models of chemical bonding (DOK 1-3) **9th(N), 11th(E)**

HSS-4b. Gather, analyze, and interpret data on chemical and physical properties of different compounds such as density, melting point, boiling point, pH, and conductivity (DOK 1-2) **9th (E)**

HSS-4c. Use characteristic physical and chemical properties to develop predictions and supporting claims about compounds' classification as ionic, polar or covalent (DOK 1-2) **9th (I), 11th (E)**

HSS-4d. Describe the role electrons play in atomic bonding (DOK 1) **9th (E)**

HSS-4e. Predict the type of bonding that will occur among elements based on their position in the periodic table (DOK 1-2) **9th (I), 11th (E)**

◆ **LT5. I can describe and distinguish what energy is and how it transfers. (DOK 1-3)**

HSS-5a. Develop, communicate, and justify an evidence-based scientific explanation regarding the potential and kinetic nature of mechanical energy (DOK 1-3) **9th (E)**

HSS-5b. Use appropriate measurements, equations and graphs to gather, analyze, and interpret data on the quantity of energy in a system or an object (DOK 1-3) **12th (I)**

HSS-5c. Use direct and indirect evidence to develop predictions of the types of energy associated with objects (DOK 2-3) **12th (N)**

HSS-5d. Identify different energy forms, and calculate their amounts by measuring their defining characteristics (DOK 1-2) **12th (N)**

◆ **LT6. I can evaluate energy transformations both quantitatively and qualitatively. (DOK 1-2)**

HSS-6a. Use direct and indirect evidence to develop and support claims about the conservation of energy in a variety of systems, including transformations to heat (DOK 1-3) **9th (E)**

HSS-6b. Evaluate the energy conversion efficiency of a variety of energy transformations (DOK 1-2) **12th (N)**

HSS-6c. Describe energy transformations both quantitatively and qualitatively (DOK 1-2) **9th (E)**

HSS-6d. Differentiate among the characteristics of mechanical and electromagnetic waves that determine their energy (DOK 2) **12th (N)**

HSS-6e. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate energy conservation and loss (DOK 1-2) **12th (N)**